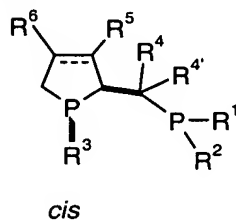


Abstract

The invention is concerned with new phosphine ligands of formula I



wherein

R^1 and R^2 are independently of each other unsubstituted alkyl, aryl, cycloalkyl or heteroaryl, or alkyl, aryl, cycloalkyl or heteroaryl each of which independently is substituted by alkyl, alkoxy, halogen, hydroxy, amino, mono- or dialkylamino, aryl, $-\text{SO}_2-\text{R}^7$, $-\text{SO}_3^-$, $-\text{CO}-\text{NR}^8\text{R}^8$, carboxy, alkoxycarbonyl, trialkylsilyl, diarylalkylsilyl, dialkylarylsilyl or triarylsilyl; R^3 is alkyl, cycloalkyl, aryl or heteroaryl; $R^{4'}$ and R^4 are independently of each other hydrogen, alkyl or optionally substituted aryl; or $R^{4'}$ and R^4 together with the C-atom they are attached, form a 3-8-membered carbocyclic ring; dotted line is optionally a double bond; R^5 and R^6 are independently of each other hydrogen, alkyl or aryl, R^7 is alkyl or aryl; and R^8 and R^8 are independently of each other hydrogen, alkyl or aryl; the substituents attached by the bold bonds are in *cis* relation to each other; metal complexes with such ligands in asymmetric reactions.

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